March 17, 2011

Via Electronic Filing

Marlene H. Dortch
Secretary
Federal Communications Commission
445 12th Street, SW
Washington, DC 20554

Re: *Ex Parte* Communication, WC Docket No. 07-245

Dear Ms. Dortch:

CTIA–The Wireless Association® has been actively involved in this proceeding and as such reviews the filings made in the docket. CTIA believes that the information supplied by ATC Outdoor DAS, LLC in its March 15, 2011 *ex parte* filing provides significant data and information concerning the added efficiencies and benefits that would flow from utilizing pole top installations rather than communications space attachments and distributed antenna systems ("DAS"). The improved coverage, lowered cost, and speedier installations cited in that filing demonstrate many of the public interest benefits of pole top DAS attachments. Moreover, based on information received after contacting members of its Tower Siting Working Group, CTIA believes that there are *additional* and substantial public benefits:

- ***Job creation.*** As many as 5,000 additional jobs could be created through direct industry hiring and indirect economic development benefits if the FCC were to require utilities to offer pole top attachments for wireless equipment with a defined make ready timeline to ensure certainty for wireless attachers.[1]

- ***Increased number of attachments.*** If the FCC were to require utilities to offer pole top attachments for wireless equipment, such deployments would become a more viable solution, and the number of such deployments annually would increase substantially — in the magnitude of 2,500 to 5,000 sites. To provide perspective, 5,000 sites is nearly equivalent to the entire number of sites (5,706) that were added nationally during the period of June 2009-June 2010.

- ***Public safety benefits.*** The Commission has recognized that "the deployment of facilities without unreasonable delay is vital to promote public safety, including the availability of wireless 911, throughout the nation," and cited with approval comments by NENA that commercial and public safety communications "depend on the presence of sufficient wireless towers."[2] The ability of DAS and microcells to

[1] *See Ex parte* filing by CTIA–The Wireless Association® at 6-7, WC Docket No. 07-245 (proposing a 178-day wireless make ready timeline) (filed Mar. 15, 2011); *Ex parte* filing by the DAS Forum, a membership section of PCIA–The Wireless Infrastructure Association, WC Docket No. 07-245, at 1-3 (filed Mar. 15, 2011).
[2] *Petition for Declaratory Ruling to Clarify Provisions of Section 332(c)(7)(B) to Ensure Timely Siting Review, Declaratory Ruling,* 24 FCC Rcd 13994, 14006 (2009) (*quoting* NENA Comments at 1-2), *recon. denied,* 51 Comm. Reg. 5106 (2010).

contribute to these efforts will be diminished if it cannot reach its fullest potential via pole top access.

In addition, CTIA encloses a brief paper by Dr. Charles L. Jackson on the significant benefits of pole top access for wireless carriers. Dr. Jackson, whose qualifications are well known to the Commission, concludes that the technical advantages of pole top mounting will ultimately redound to the benefit of wireless consumers.

Accordingly, CTIA submits that there are numerous public interest considerations that would flow from the Commission requiring utilities to provide pole top antenna installation access on a fixed timeline.

Pursuant to Section 1.1206 of the Commission's rules, a copy of this letter is being filed via ECFS with your office. Should you have any questions, please do not hesitate to contact the undersigned.

Sincerely,

/s/ *Brian M. Josef*

Brian M. Josef
Assistant Vice President, Regulatory Affairs

Christopher Guttman-McCabe
Vice President, Regulatory Affairs

Attachment

cc: Sharon Gillett
Christi Shewman
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Jonathan Reel
Marcus Maher
Marvin Sacks
Dan Abeyta
Donald Johnson
Zachary Katz
John Giusti
Margaret McCarthy
Christine Kurth
Angela Kronenberg
Charles Mathias
Brad Gillen

ATTACHMENT

Observations on Pole Access for Wireless Carriers

Dr. Charles L. Jackson
17 March 2011

Introduction and Overview

This brief note reviews some of the basic technological factors driving the cost and capacity of wireless networks. Specifically, it reviews the benefits that would be created by giving wireless carriers timely access to the top of utility poles for mounting antennas to serve small cells.

Small Cell Networks

Modern wireless systems are marvels of complexity. Each second of speech carried over a modern wireless call requires many millions of computations in both the handset and the fixed network. Nevertheless, one of the key factors in expanding network capacity is the concept of cellular reuse. Early wireless telephone systems transmitted voice signals over wide areas—much like radio broadcast stations. The cellular concept replaced these wide coverage areas with smaller coverage areas allowing a frequency to be used multiple times in the same community. The complex processing of modern wireless systems expands the total capacity at a single cell site over that previously available. But, once the capacity limit of today's technology is reached at the cells in a system using existing spectrum, the only available means to increase capacity is to use more but smaller cells.

Over the last three decades the wireless industry has installed hundreds of thousands of cell sites in order to increase coverage and capacity to meet continually growing demand. Creating new cell sites brings with it several problems. First, cell sites are expensive facilities requiring installation of electronics, purchase of real estate or payment of rent to a landlord, and a backhaul connection to the carrier's network. Second, complying with and obtaining the necessary federal, state, local, environmental and land-use approvals and building the facilities require a significant expenditure of time, effort and money.

The Commission has promoted, and the wireless industry has embraced, the concept of collocation because to the extent that a number of carriers can utilize the same platform to provide their desired coverage, the number of new facilities required, and the cost per carrier, declines.

Existing utility poles have many advantages as locations for cell sites. They are plentiful, usually have access to electricity and, if fiber is not already present, it often can be installed relatively affordably. No new roads have to be installed or antenna structures built. The permitting process can be streamlined or accelerated, because the antenna will be collocated on an existing structure. Moreover, in much of the country, utility poles are located in nearly optimum locations for cells serving small areas. In short, utility poles can often be an attractive solution to the challenge of cost-effective and spectrally efficient placement of wireless cell sites.

Higher Antennas Provide Markedly Better Coverage

Wireless antennas located at the highest point on a utility pole—the very top—can provide significantly more and better coverage than can antennas located lower on the pole, say in the communications space. This improved coverage means that service can be provided at less cost—making capacity expansion easier for carriers and lowering infrastructure costs and thus the ultimate price paid by consumers.

The magnitude of the possible cost savings can be illustrated by a few simple calculations using widely accepted "rule-of-thumb" engineering formulas. Just as a person can see farther when he or she stand ups or climbs a ladder, a radio wave propagates farther the higher the antenna is placed. An approximation that is often used in wireless engineering is that if an antenna is twice as high, the signal at any given distance is four times as strong.[1] Another common approximation is that a wireless signal diminishes in strength

[1] See Professor Jones's lecture notes at http://people.seas.harvard.edu/~jones/es151/prop_models/propagation.html for an exposition of this rule of thumb.

in proportion to the distance between the transmitting antenna and the receiving antenna raised to the fourth power.[2]

If we consider a representative pole, say one with its top 30 feet above ground and with the communications space 20 feet above ground, then together these formulas predict that an antenna on the top of the pole will send a usable signal about 25% farther than an antenna located in the communications space and will serve an area fully 50% greater. Serving a 50% greater area may not sound like a lot but it means that an area that would require 300 antennas mounted in the communications space could be served with 200 antennas mounted on pole tops.

The American Tower Example

On March 15th of this year, American Tower filed an ex parte submission in WC Docket No. 07-245 addressing this issue. Slides 6 and 7 of that presentation showed two systems engineered to provide comparable coverage. One system used antennas mounted on the top of utility poles, the other used antennas mounted in the communications space. The top-mounted design required antennas at 55 locations to provide adequate coverage; the design with lower antennas required antennas at 76 locations to provide the same coverage, and the top-mounted antenna were able to support more service than those mounted in the communications space. In this example, using lower antennas required 21 more antennas or 38% more. This 38% is a reasonably close match to the 50% more calculated above. The consistency of these answers lets us become more confident that each is correct.

Observations

Some important points must be noted. First, radio coverage is complex and highly variable. In some circumstances the differences between coverage provided via antennas placed on the pole top and the communications space will be far greater than indicated above. For example, if the communications space is surrounded by foliage, as it is on many residential streets, but the pole top pokes up above the top of the trees, then the

[2] The widely used COST 123/Hata propagation model assumes a slightly lower attenuation with distance—with attenuation proportional to the 3.6th power of the distance. The use of the fourth power in this note is conservative but does not change the results substantially.

coverage from the pole top might be two or three times greater. It is hard to quantify the impact of the occasional "good pole location" but it should be expected to be significant.

Second, it should also be noted that the coverage area of the cells served even from the top of a utility pole is quite small. Examining the coverage map provided by American Tower allows one to estimate that the radius of each cell is less than 0.1 miles.[3] Use of such small cells, while requiring significant investment, carries with it the significant benefit of dramatically expanding system capacity.

Third, the analysis in this paper only considers the effects of antenna height on coverage and cost. The American Tower study cited here considered other factors as well, such as the size limitations necessarily imposed on antennas located in the communications space, which would also limit capacity and increase the cost of systems restricted to the communications space. See slides 8-13 of the American Tower presentation. American Tower states that considering these additional factors increases the possible savings from pole top mounting significantly—resulting in a system restricted to the communications space costing 60 to 70% more compared to the 50% additional cost calculated here.

The Impact of Cost on Innovation and Adoption

If wireless carriers are not forced to use a system design that is 50 to 70% more expensive than the less-costly and better-performing alternative, it will be easier for carriers to afford the investment necessary to build out. Or, looking at it another way, if a carrier has an investment budget of $2 billion for network build out, permitting use of the more efficient system design will allow the carrier to provide expanded coverage to 50 to 70% more homes. If one assumes, as is likely given institutional planning and financial constraints, that carrier capital budgets are relatively fixed for the next two years or so, then permitting CMRS carriers to attach to pole tops as well as in the communications space is one way regulators can speed up the roll out of high-capacity wireless broadband access.

[3] Examining the map and comparing the size of the indicated coverage areas to the dimensions of the triangular area shown on the map at 35.412347,-80.912418, allows one to determine that the coverage radius is about 300 feet.

As discussed, pole-top access will give wireless carriers the ability to increase their spectral efficiency and lower their costs, permitting greater buildout for the dollar. As a related matter, given the competitiveness of the CMRS industry, these capital investments will control the costs paid by consumers. Permitting CMRS carriers to attach to the top of utility poles will lower costs to consumers and make it easier for consumers to purchase and use wireless broadband access.

About the Author

Dr. Charles L. Jackson is an electrical engineer who has worked extensively in communications and wireless. He has been both a digital designer and a system programmer. He works as a consultant and as an adjunct professor at George Washington University, where he has taught graduate courses on computer security, networking and the Internet, mobile communications, and wireless networks. Dr. Jackson consults on technology issues—primarily wireless and telecommunications. Dr. Jackson served three terms on the FCC's Technological Advisory Council. He previously worked at both the FCC and the House Commerce Committee. He holds two U.S. patents. Dr. Jackson received his PhD from MIT.